NEGATIVE COMMENTS TO DATE - ANECDOTAL

The airport manager of an airfield adjacent to and competing with an airport equipped with a SuperUnicom felt that the historically shared common frequency between the two airports was unfortunate and was being further aggravated by the presence of automated services at the competing airfield, thereby "interfering with his operations."

An FAA staff person based at the same airfield, adjacent to the airport equipped with the SuperUnicom, commented that he used the SuperUnicom at the competing field even while operating at his own airport as the Unicom services at his own airport were often not available.

The Unicom operator/counter person/line service/fuel attendant at a SuperUnicom equipped airport found annoying the repetitiveness of the SuperUnicom's transmissions as the system was in heavy use by pilots at all times.

A pilot based at a SuperUnicom equipped airport commented that he was annoyed at the unit because he could not activate nor receive it far enough out from the airport.

A corporate pilot inbound to a SuperUnicom equipped airport used the system to obtain Advisories and when interviewed upon landing commented that he disliked automation. In the same discussion he volunteered that he also disliked telephone voice mail.

An older pilot, based at an airfield not equipped with a SuperUnicom, contacted the developers of the system and commented that he felt that the FAA's policy that pilots should use their radios at uncontrolled fields was "all wrong," and further that he felt the Advisory information provided by the SuperUnicom was therefore unnecessary and annoying.

APPENDIX F

SUPERUNICOM

Interim Developmental Report

May 4, 1994

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SUPERUNICOM

OVERVIEW

Over 15,000 airports in the United States operate without the guidance of a control tower or any other form of reliable Advisory service. These facilities predominantly rely on air–to–air contact between aircraft sharing a common frequency (Multicom) or ground based radio services at the airport (Unicom) to provide Advisory and Radio–Check services that are often unavailable. Although essential for air safety, Unicom services remain marginal at the vast majority of airports throughout the country. The SUPERUNICOM improves the safety of operations at these facilities by providing unintrusive, automated, 24 hour, Advisory and Radio–Check services on the airport's already assigned Common Traffic Advisory Frequency ("CTAF").

The SUPERUNICOM system has been specifically developed to respond to the generally poor level of Unicom services prevalent at non–towered airports. Unicom stations are often unattended or attended sporadically, and often managed, when available, by airport personnel who are primarily occupied with other airport needs. Therefore, even under the best of circumstances, Unicom service is provided on an as–available basis and often not at all.

The SUPERUNICOM system applies automation and computer technology to provide both basic and enhanced Unicom services in a consistent and reliable manner and at all hours. The system employs state–of–the–art sensors that are capable, upon demand, of providing pilots complete Advisory data and Radio–Check services. Uniquely the system also provides qualitative conclusions during all hours that emphasize for pilots those conditions that may be critical to flight operations. For example, a Pilot inbound at night will hear from the SUPERUNICOM the basics of current wind speed and direction, temperature, etc; and they will also be forewarned of crosswind conditions, possible ground fog, and high density altitude as conditions warrant. These unique safety features enhance the SUPERUNICOM's ability to preclude accidents above and beyond the services generally available on Unicom.

The critical safety need for Advisory services is well accepted. In an attempt to respond to this need the Federal Aviation Administration (FAA) has begun to implement a network of some 1,500 Automated Weather Observation Stations (AWOS) throughout the U.S. at high traffic airports. Each of these AWOS facilities transmits a continuous broadcast of local weather measurements and thus requires a dedicated frequency. In the United States alone there are 18,000 landing sites of which less than 700 have Air Traffic Control Towers. Of those with Control Towers many are only open during limited hours. Due to the cost of AWOS systems and the limited frequency spectrum available for their mandatory discrete frequency allocations, there are only some 1,500 AWOS sites scheduled for installation through the next decade. Thus, the only alternative to a technology such as SUPERUNICOM is for the remaining 15,000 airports to continue to have little or no services at all.

A barrier to the broad application of any new communication technology is the scarcity of unassigned frequency spectrum. To be of the greatest benefit any solution must therefore find a means to operate on those frequencies that are already set aside for Unicom/Multicom services. In addition the system must be capable of providing services in such a manner as to not interfere with the current operations on such frequencies. Critical to the success of this technology is the SUPERUNICOM's ability to adaptively modify the length and content of its own transmissions such that these transmissions fit within the ever present and ever varying levels of communication already existing on the selected CTAF frequency. The SUPERUNICOM system succeeds in providing the full range of Unicom services by interactively operating in a non–intrusive way on any airport's already assigned Common Traffic Advisory Frequency ("CTAF") frequency. The SUPERUNICOM solution therefore requires no additional radio spectrum.

This interim report, through historical data and user comment, demonstrates that the SUPERUNICOM concept not only accomplishes the goals set forth, but has been readily accepted by the Aviation community as solving a critical and common problem to air safety.

To facilitate both the development and the documentation of the SUPERUNICOM the system records the date, time, duration and nature of all communications on the frequency; including a record of the Advisories and Radio Checks requested of it by pilots. With the most recent data retrieved from the SUPERUNICOM systems being evaluated at the initial two locations it is notable that within a period of less than 60 days pilots requested Advisories over 5,000 times and Radio-Checks in excess of 3,000 times. These services were provided on a regular, consistent basis, at all hours, including those non-business hours when the Unicom station was not manned, and represented over 8,000 instances in which a human Unicom operator was either not available, or was available but was in fact freed by the SUPERUNICOM to provide other services. The mere magnitude of this response from pilots indicates not only a strong demand for this technology but an immediate readiness to use it.

In February 1994, after an on-site evaluation of the original SUPERUNICOM prototype, FCC headquarters and the FCC licensing office authorized developmental licenses for the SUPERUNICOM system to operate at two public airports for evaluation and development: The Potomac Airfield in Fort Washington Maryland and the BayBridge Airport in Stevensville Maryland. This interim report summarizes the findings to date. The purpose of this report will be to review and integrate the respective developmental locations and the profile of their pilot users; each of the SUPERUNICOM features will be reviewed within the context of each of the locations, and the ongoing developments and enhancements that have resulted from these tests will be summarized.

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THE SUPERUNICOM LOCATIONS

POTOMAC AIRFIELD: This airport is a General Aviation airport accommodating approximately 100 based single and light twin engined aircraft having an estimated 20-30,000 air traffic operations per year. This airport has three flight schools having some twenty training aircraft which results in intense training activity. The Potomac Airfield is located within one of the busiest and most complex airspaces in the US, being located five miles to the West of Andrews Air Force Base; seven and one half miles from Washington DC's National Airport, and four miles West, North-West of the Hyde Field; another similar airfield sharing the same Unicom frequency of 122.80 MHz. Thus, pilots operating at Potomac, and thereby within this complex airspace, are routinely faced with intense and demanding radio communications as a normal operating standard. The intensity of radio communications between both the Potomac Airfield and the Hyde Airport, the close proximity to controlled airspace, and the facility's physical limitations all tend to exclude less proficient pilots. At this location the SUPERUNICOM provides the sole means for pilots to obtain Unicom services. It is therefore a reasonable conclusion that the historical data of pilot's interactions with the SUPERUNICOM gathered at this location reflect a cross-section of communications-proficient pilots who are familiar with the airport's features due to repeated operations at the facility. In addition, the nearby Hyde Airport also shares a common Unicom frequency and thus offers some unique insights into interaction with another close proximity airport operating on the same Unicom frequency.

BAYBRIDGE AIRPORT: This facility is an airport located at the scenic juncture of the Chesapeake Bay Bridge and the Chesapeake Bay, just minutes from the attractions of several area restaurants and historic Annapolis. The airport has approximately sixty based aircraft and a

flight school with twelve active training aircraft; in total creating an estimated 40-50,000 air traffic operations per year. Baybridge attracts high volumes of transient traffic, particularly on weekends. In addition, it is estimated by the airport's management that as much as 60% of the transient aircraft traffic using the BayBridge Airport is composed of training flights coming from other airports that take advantage of BayBridge's restaurant and other facilities as a destination stop within their training routine. At BayBridge the Unicom station is monitored full time during business hours, weekdays and weekends. A broad summary of pilot's interactions with the SUPERUNICOM at this location would suggest a pilot cross-section of one-time visitors and many flight training students who may not have any familiarity with the regular operating procedures at the airfield. It should be noted that BayBridge shares the Unicom frequency of 123.0 MHz with several other airports. Thus aircraft at altitude are exposed to transmissions from many airports on the same frequency and it is within this interaction that the SUPERUNICOM must operate smoothly.

DEVELOPMENTAL FIELD EXPERIENCE GATHERED TO DATE

OVERVIEW - Issues raised during preliminary discussions with the FCC centered on how the SUPERUNICOM system would interact with other communications at altitude; would pilots accept the services provided by the SUPERUNICOM; and how well mannered the system was in the context of other communications already authorized on the frequency. During this Developmental period many other subtle issues have also come to light that have resulted in modifications to the SUPERUNICOM system.

The following summary provides an ongoing review of the issues, observations and resulting modifications that have been implemented on the two SUPERUNICOM units now under evaluation at the two preliminary sites, Potomac and BayBridge. Observations represent a combination of interviews with pilots as well as Unicom operators at these facilities, in conjunction with the empirical historical record of over 100,000 communications events on the Unicom frequencies as recorded by the SUPERUNICOM systems at each location.

ACCEPTANCE BY PILOT USERS: As the attached data makes evident, the SUPERUNICOM's traffic-sensitive, intermittent PopUp of instructions resulted in rapid pilot acceptance and understanding of how to use the system. In addition, after preliminary interviews with based pilots at both airfields, each airport was provided 25 copies of a one-page SUPERUNICOM summary tailored to respond to the most commonly asked questions by pilots. (A copy of this summary is attached with this report).

In review, the PopUp message is transmitted by the SUPERUNICOM in response to the presence of air-to-air communications, ie there are aircraft on the frequency to whom the information would be valuable.

PopUp: "XYZ Airport, Enter 3 clicks for Advisory, 4 clicks for Radio Check"

Within just a few hours of the systems being available pilots were actively triggering the SUPERUNICOM systems for Advisory and Radio-Check services. The activity is summarized below; the differences being partially attributable to differences in start dates and weather between the two locations:

	First 24 Hrs	First 60 days	
Potomac Airfield			2/24/94 through 4/24/94
Advisories	37	2,711	
Radio Checks	26	2,175	

	First 24 Hrs	First 53 days	
BayBridge Airport			
Advisories	19	3,062	3/10/94 through 5/3/94
Radio Checks	14	1,362	

ISSUE #1: TRANSMISSION CLARITY AT ALTITUDE NEAR AN AIRPORT - The proposed widespread implementation of SUPERUNICOM technology requires that four classes of frequency user be able to cooperate on the same frequency. These are:

1) Local aircraft that are either on the ground or in the air that are using the airport facility,

2) The ground based provider of Unicom/Multicom services at the airport facility,

3) Other remote aircraft and Unicom stations that are sharing the same frequency,

4) The SUPERUNICOM system serving as a provider of Advisory and Radio-Check services on the frequency at the airport facility.

SOLUTION #1A: THE SYSTEM WILL NOT STEP ON DETECTABLE TRANSMISSIONS - The sensitivity of the SUPERUNICOM's transceiver is such that it will detect all transmissions emanating from any local ground or airborne station that may be operating at the given airport. In addition, the system's logic precludes it from "stepping-on" any local transmissions that it can detect; it will defer its own transmissions until there are no other transmissions detectable on the frequency.

SOLUTION #1B: UNDETECTABLE TRANSMISSIONS ARE OFTEN NOT SIGNIFICANT- There will be occasions where remote or very weak transmissions will not be detected by the ground based SUPERUNICOM. This would allow the system to transmit simultaneously over these weak signals. Two circumstances could cause these undetectable signals; either a local aircraft transmitter is so weak that in practical terms it may be termed no-longer functional; or, due to topography or range, a remotely generated signal is sufficiently attenuated that it cannot be detected by the SUPERUNICOM.

There is little realistic response to the impossibility of seeking to have the SUPERUNICOM detect, and thus avoid conflict with, defective transmitters that may be sharing the same frequency. Thus remains the possibility that the SUPERUNICOM could "step-on" another remote, attenuated transmitter; such as an aircraft making a transmission from the ground at a remote airport. *This is a situation that neither a human nor automated Unicom can preclude.* Nonetheless, the SUPERUNICOM readily accepts a remotely mounted antenna which might better detect weak or attenuated transmissions in such installations.

SOLUTION #1C: THE SYSTEM CAN BE HEARD OVER REMOTE COMMUNICATIONS- It is desirable that the SUPERUNICOM's transmissions be clearly received by local ground services and aircraft, over and above any airport or aircraft transmissions taking place at a remote facility. These remote ground and air transmissions, while detectable and omnipresent to aircraft at altitude, are simply not important to local aircraft operations. At the SUPERUNICOM's output power of less than 2 watts its own transmissions can be clearly heard by local operations over remote transmissions. This low power also serves to greatly limit the effect the SUPERUNICOM could have on remote airport or aircraft operations.

ISSUE #2: INITIAL POPUP TRANSMISSIONS INTRUSIVE On the shared frequency between the Hyde Field and the Potomac Airfield it was noted that the PopUp of instructions, which had been predominantly time based, was intrusive in that it occurred too often during

high-traffic times, and occurred unnecessarily during quiet times, thus annoying the Unicom operator at the non-SUPERUNICOM facility.

SOLUTION #2: The interval between PopUp transmissions was lengthened. In its original form it would, after as little as a one minute interval, wait for a quiet time on the frequency and then transmit. This interval was lengthened to a minimum of 3 minutes, which would rapidly increase to one attempt every 10 to 20 minutes as traffic increased. In addition, the PopUp was entirely suppressed during quiet times of no traffic.

It was observed that the isolated, inbound Pilot would typically make an initial blind call on the Unicom frequency to any other potential air traffic. In response, the SUPERUNICOM was modified so that upon hearing this "Isolated Call" it would PopUp its instructions once in response, thereby giving the inbound Pilot the necessary instructions on how to obtain valuable Advisory information. In response to this modification the data demonstrates that isolated pilots hearing this PopUp of instructions do in fact request and obtain Advisories soon thereafter.

ISSUE #3: EXTREME FREQUENCY CONGESTION It was observed at BayBridge that during peak traffic times the number of conversations could approach 250 per hour. During these times the initial response level of the SUPERUNICOM was intrusive. During one peak hour pilots at BayBridge heard the SUPERUNICOM provide Advisories 23 times. Although typically separated by more than one minute between Advisory transmissions, this level of transmission was excessive. With an attentive pilot population listening to the frequency one Advisory every 3 to 5 minutes should be sufficient for all inbound aircraft to hear it at least once.

It was observed that there were an abundance of repeated Advisory requests by pilots. It was also observed that there were two primary causes of these repeated Advisory transmissions:

CAUSE FOR REPEATED ADVISORIES #1: The low power output of the SUPERUNICOM's transceiver caused its transmissions to be "stepped on" by far away transmissions from other airports sharing the same frequency. Thus pilots might trigger the Advisory several times before successfully hearing the SUPERUNICOM transmission.

SOLUTION #3A: While power output remained the same, the modulation level of the transmitter, initially set at its lowest setting, was increased. The net effect was to increase the clarity of the SUPERUNICOM transmissions so that they could be successfully heard over other more distant, non-pertinent radio transmissions.

CAUSE FOR REPEATED ADVISORIES #2: While pilots are trained to stop and listen to a frequency before transmitting, in practice this is often not the case. Thus as each new aircraft would arrive at BayBridge it would often make its own call for an Advisory, rather than listen for a moment to the same information being provided to a prior aircraft perhaps one minute earlier, or one minute later.

SOLUTION #3B: When a high-traffic situation occurs with an Air Traffic Controller on the frequency the Controller will respond to a pilot with the phrase *"Please Stand By."* pilots respond to this phrase by making no further unnecessary transmissions and by listening for further instructions. The SUPERUNICOM was modified such that during peak traffic times, measured as more than a certain level of air-to-air communications within 30 seconds, the SUPERUNICOM will similarly respond to an Advisory request with the phrase *"Please Stand By."* Having made this transmission it will then not respond to any further Advisory requests until the frequency has cleared, at which time it will then transmit the one queued Advisory to the expectant Pilot.

SOLUTION #3C: To respond to congestion on the frequency the SUPERUNICOM adaptively changes both the length and the content of the information it provides to an Advisory request, based on the general levels of activity on the frequency. Thus, during the quietest of times pilots will hear a full Advisory, and as the frequency increases in activity the system abbreviates the information it will provide in an Advisory down to only the most critical elements:

FULL ADVISORY:	"XYZ Advisory, Temperature 75, Dewpoint 65, Wind 240 at 12, Altimeter 29.92, Density Altitude 1,300."
SHORTER ADVISORY:	"XYZ Advisory, Wind 240 at 12, Altimeter 29.92."
SHORTEST ADVISORY:	"XYZ Advisory, Wind 240 at 12."

ISSUE #4: It was observed, predominantly at BayBridge, that pilots inbound who were unfamiliar with the airport and with the SUPERUNICOM would often miss the PopUp instructions and would instead request an Advisory verbally, as opposed to actuating the SUPERUNICOM with clicks.

SOLUTION #4: REDUCED POPUP INTERVAL By going through the historical data of transmissions it was noted that the PopUp instructions were being suppressed during peak times to the extent that many aircraft never had the opportunity to hear these transmissions. The interval was adjusted down such that during medium traffic times the SUPERUNICOM would attempt a PopUp approximately once every five minutes, when the frequency was clear; and during peak times no less than one PopUp transmission would be attempted every ten to twenty minutes. By thus increasing the probability that every inbound pilot would hear how to obtain an Advisory at least once during their traffic pattern, more pilots knew how to obtain the Advisory from the SUPERUNICOM.

ISSUE #5: ADVISORY TOO SHORT When the frequency is quiet the SUPERUNICOM will respond to requests by pilots with a complete Advisory containing the following elements: Temperature/Dewpoint, Wind Speed/Direction, Altimeter, Density Altitude, and any Notices to Airmen. To minimize the SUPERUNICOM's presence on the frequency this transmission is shortened to just providing winds if there is the slightest presence of other traffic on the frequency. The consequence of this is that on occasion pilots sought more information than the system provided.

SOLUTION #5: RE-REQUEST It is common practice for pilots to ask for further information, for example during a weather briefing, when the standard procedure is too brief. A modification allows the SUPERUNICOM to provide a complete Advisory when another Advisory request is received within a short time after completing its shortened Advisory.

ORIGINAL REQUEST	"click, click, click"
BASIC ADVISORY	"BayBridge Advisory, Winds Calm"
RE-REQUEST (<3 secs)	"click, click, click"
FULL ADVISORY	"Baybridge Advisory, Temperature 75, dewpoint 68, Wind Calm, Altimeter 29.92, Density Altitude 1,200."

ISSUE #6: BACK-TO-BACK ADVISORIES A potential Issue that was raised by the operator at Hyde Field was the possibility that someone who wanted to be annoying could trigger the

SUPERUNICOM creating back-to-back Advisory Requests and thereby tie up the frequency. Subsequent to this concern being raised there were in fact two occasions of this behavior observed on the shared frequency between the Hyde Field and the Potomac Airfield.

SOLUTION #6: IDIOT FILTER To preclude such intentionally interfering behavior an "Idiot Filter" was implemented. The function of this filter allows two back-to-back Advisories, but then ceases to respond for a short period of time to any further requests. It is believed that this will disturb any intentional attempt by any party to make the system misbehave. There have been no reoccurrences of such behavior since this filter was installed.

ISSUE #7: RUNWAY IN USE Although by regulation and by training pilots are supposed to "determine the runway in use using all information available" it was noted, predominantly at BayBridge, that inbound pilots often could not or would not make this determination on their own. The net effect for the frequency was that these pilots would typically request an Advisory, hear the winds, and continue to request Advisories over-and-over until the Unicom operator would have to step in and state a particular runway.

SOLUTION #7: Short of actually calling the runway in use, the proper Unicom response to such bewildered pilots is to specifically inform the pilot of how they should determine the Runway In Use. The SUPERUNICOM was modified to terminate its Advisory transmission with one of two phrases, depending on the presence of other traffic on the frequency:

When air traffic in pattern: "... For Runway, Listen to traffic."

When no traffic in pattern: "... For Runway, Pilots discretion."

In the brief time this modification has been implemented, to the delight of the Unicom operators at BayBridge, it has been noted that in response to this message inbound pilots will stop and make their own determination as they are supposed to, and not "drive the Unicom operator crazy" with unnecessary repeated calls for an Advisory. The net result has been fewer unnecessary transmissions by both pilots and by the SUPERUNICOM on the Unicom frequency.

ISSUE #8: SHARED UNICOM BETWEEN MULTIPLE AIRPORTS When flying at altitude above any airport it is common that airports with shared frequencies will often have radio transmissions that overlap. This is a common and unavoidable aspect of shared frequencies among many aircraft and many airports. The findings at the two initial Developmental facilities contrast and will therefore be addressed separately.

ISSUE #8A: POTOMAC AIRFIELD & HYDE AIRPORT (122.80 MHz): These two airports are located less than five miles apart and are at different elevations. The proliferation of transmissions from both facilities on the same frequency is an unavoidable consequence of these two airports having nearly overlying traffic patterns, which in turn necessitates sharing the same Unicom frequency. The SUPERUNICOM unit is located in a valley at the Potomac Airfield. The Developers monitor this common frequency with a seperate 75 ft antenna and receiver which detects *all* transmissions from both facilities. While the SUPERUNICOM detects all transmissions from all airborne aircraft operating at both airports (totalling perhaps 50-60,000 air traffic operations per year) and all strong aircraft radios on the ground at either airport, it has been observed that the SUPERUNICOM does not always detect weak aircraft radios transmitting on the ground at Hyde Field. There have therefore been occasions when the SUPERUNICOM will make its transmission "on top of" a weak transmitter on the ground at the remote airport that the SUPERUNICOM cannot detect and would otherwise avoid.

SOLUTION #8A: A weak aircraft radio transmitting on the ground at the non-SUPERUNICOM facility will still transmit over the lower powered transmissions from the

SUPERUNICOM, unless the aircraft radio is down to perhaps 10% of its designed output. If an aircraft radio's output, which should be no less than 5 watts, cannot be heard over a signal of 500 milliwatts coming from 5 miles away, the basic conclusion is that there is a serious problem with the aircraft's radio that needs correction.

Nonetheless, in such extraordinary installations where two airports are nearly atop each other it is recommended that the SUPERUNICOM be set to the lowest modulation levels to permit all transmissions to "step on" the SUPERUNICOM's transmissions as necessary. In addition, the external antenna option available on the SUPERUNICOM allows for a remote antenna to be placed such that it would more likely detect transmissions under all circumstances.

ISSUE #8B: BAYBRIDGE AIRPORT & ST MARY'S AIRPORT, BALTIMORE AIRPARK, FREDERICK AIRPORT (123.00 MHz): Prior to the installation, and with each adjustment of levels and antenna refinement, the operators at the other airports were contacted and sent information and updates regarding the SUPERUNICOM at BayBridge. Not only have there been no conflicts, but the operators at these other airports have asked a common refrain, "The SUPERUNICOM sounds great, how can we get one?" (This response much pleased the system' developers). Repeated contact has obtained the same comments.

SOLUTION #8B: In contrast to the experience at Potomac, it was observed that often the SUPERUNICOM's low power transmissions were being "stepped on" by irrelevant transmissions from other airports as much as 40 miles away. This would cause an inbound pilot at altitude to retry the Advisory several times until circumstances would allow them to hear the transmission over the irrelevant chatter from the remote airport. The request was made by the Unicom operator to increase the SUPERUNICOM's output power such that its transmissions would be heard by pilots in the pattern at BayBridge over the remote transmissions from far away. While output power remained limited the modulation level was increased, the change providing the desired result.

OVERALL SHARED FREQUENCY SOLUTION:

SENSITIVITY - The SUPERUNICOM has been shown effective at detecting and thereby avoiding conflict with most any transmissions on its selected frequency, except those that are simply undetectable by virtue of terrain, or are themselves at very marginal output power. While not absolutely perfect, the SUPERUNICOM's sensitivity to the transmissions of others has been shown to be at least as effective as could be achieved by any humanly operated Unicom station. The logic built into the SUPERUNICOM that verifies no other transmissions before making its own, guarantees that it will be well mannered 100% of the time it can detect any others signals. *It is a well known and observed fact that human radio operators, be they Unicom operators or Aircraft pilots, rarely achieve a level of courtesy and consistency that is part of the built-in nature of the SUPERUNICOM's logic.*

RADIO POWER OUTPUT - Traditional Unicom stations are licensed at up to 10 watts output power. At under 2 watts the relative power of the SUPERUNICOM can be heard over the output of any nearby operating aircraft or ground stations. It is desirable to have the SUPERUNICOM clearly audible over the transmissions of distant airports that may be sharing the same frequency. The recommended power output, based on observations to date, seems to be well balanced between the needs of being heard clearly while also permitting nearby Aircraft and Ground Stations to be heard.

IN SUMMARY

The SUPERUNICOM system has been broadly accepted and is experiencing intense use by pilots at both locations. As the system is exposed to new operating environments, having

differing types of air traffic, the developers have had the opportunity to further refine the SUPERUNICOM system to behave ever more effectively within these environments.

During this initial phase there have already been numerous requests by other airports for SUPERUNICOM capability to solve this well known and frustrating problem common to these operations. This suggests that the problem being solved by the SUPERUNICOM is widespread, well known, and that the proposed solution is readily understood and accepted.

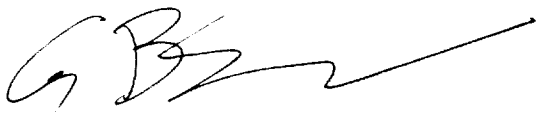
Working with the Maryland Aviation Administration the Developers wish to expand the scope of the current Developmental License to allow for testing at other candidate airports having higher levels of traffic. Several candidate airports have been discussed, including Frederick Maryland and Gaithersburg Maryland, each of which has much higher levels of traffic than either Potomac or BayBridge. This request for expansion shall be submitted under separate cover.

The written and oral comments from the current pilots and users of the SUPERUNICOM, in addition to the Aviation Trade Associations, Aircraft Owners & Pilots Assoc (AOPA), National Business Aircraft Associations (NBAA), General Aviation Manufacturers Assoc (GAMA) as well as the relevant Governmental Authorities (FCC and FAA) have all been supportive and encourage the development of the SUPERUNICOM technology.

It is anticipated that based upon current results and with the support of the Trade Associations and the Governmental Authorities thus far demonstrated that the Developers will seek within the next six months a rulemaking or amendment to the FCC's regulations to specifically permit the authorization of this type of adaptive technology to operate on any authorized Unicom/Multicom frequency.

The developers of the SUPERUNICOM wish to thank all parties that have been of assistance with this process and we look forward to the continuing opportunity to provide you with information as to the progress and implementation of the SUPERUNICOM system on a broad basis.

David Wartofsky



Gary Simon

APPENDIX A:

POTOMAC AIRFIELD

SYSTEM ACTIVITY

2/24/94 through 5/3/94

SUMMARY OF GRAPHS

The graphs in the following section are taken from the historical data recorded by the SUPERUNICOM systems on site. The graphs are explained briefly below:

CONVERSATIONS A count of the total number of conversations that took place on each day. The average conversation lasts 4.04 seconds.

ADVISORIES A count of the total Advisories that the SUPERUNICOM provided each day. Advisory may be as short as 4 seconds and as long as 20 seconds, depending on congestion of the frequency. The average Advisory is 8.48 seconds in length.

RADIO-CHECKS A count of the total number of Radio Checks that were performed each day by the SUPERUNICOM. Recent updates limit the length of Radio-Checks to 5 secs of recording time, thus the average Radio-Check is 5.71 seconds.

POPUP INSTR A count of the total number of PopUp instructions were provided by the SUPERUNICOM for each day. PopUp instructions are under 3.55 seconds in length.

BUSIEST DAY The total number of transmission events on an hour-by-hour basis during the busiest day of the study period to date.

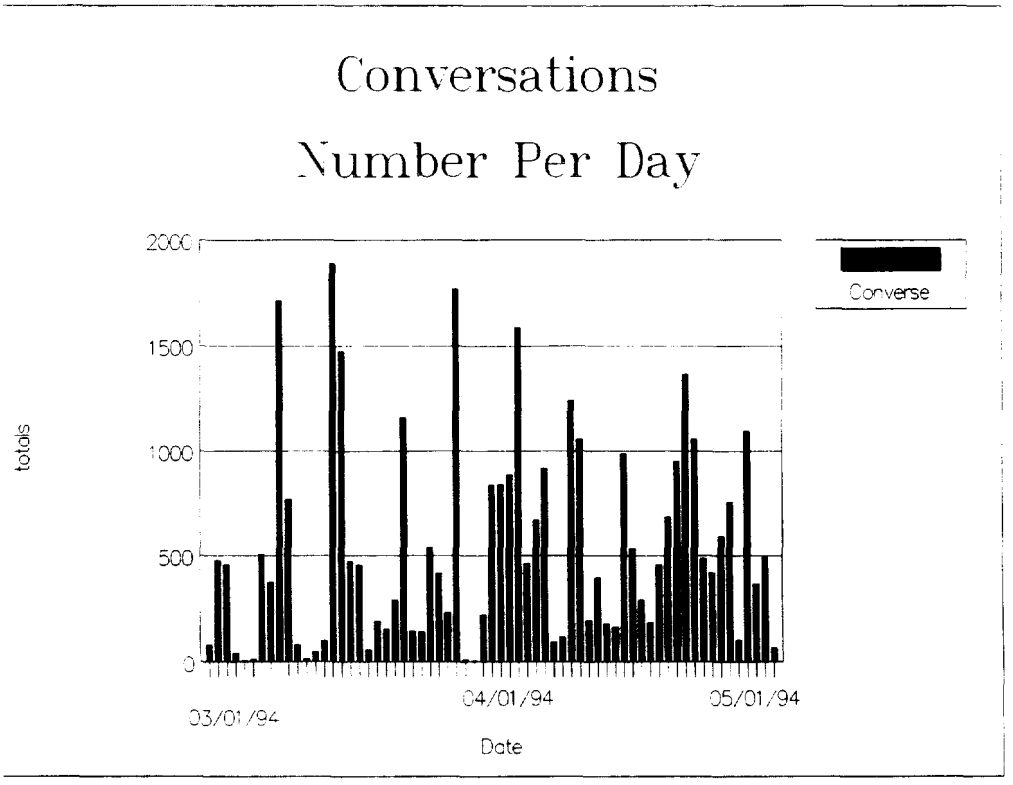
TRANSMIT TIME The total duration in seconds of each type of transmission on an hour-by-hour basis during the busiest day of the study period to date.

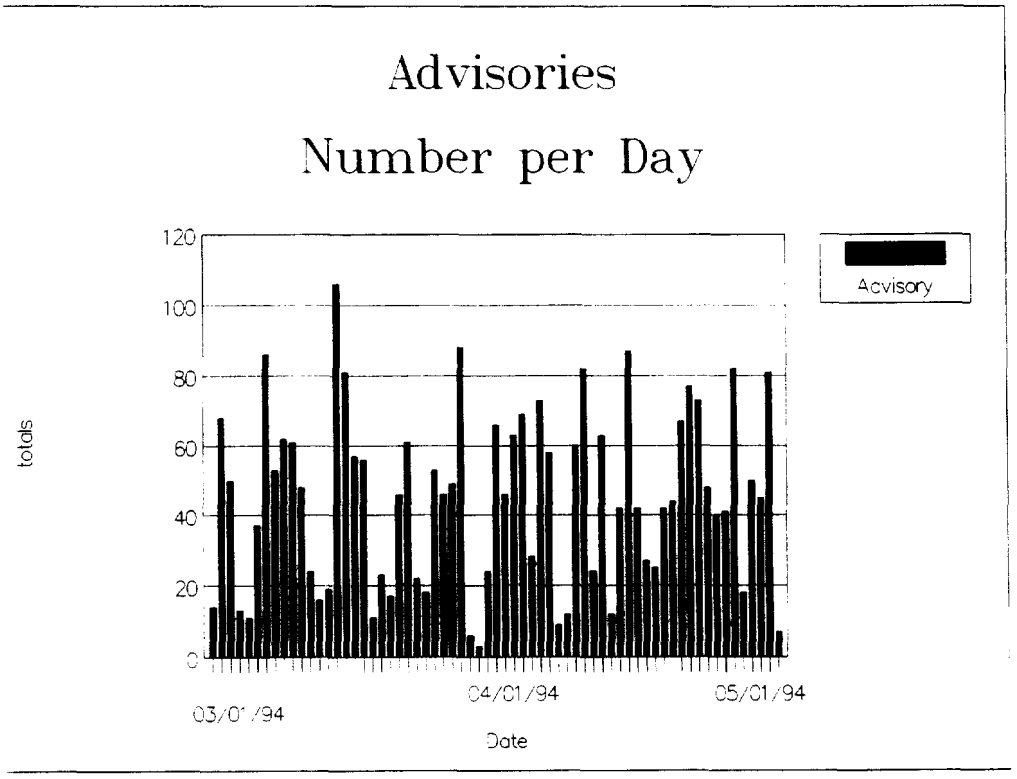
BUSIEST HOUR The total duration in seconds of each type of transmission event during the busiest hour of the busiest day of the study period to date.

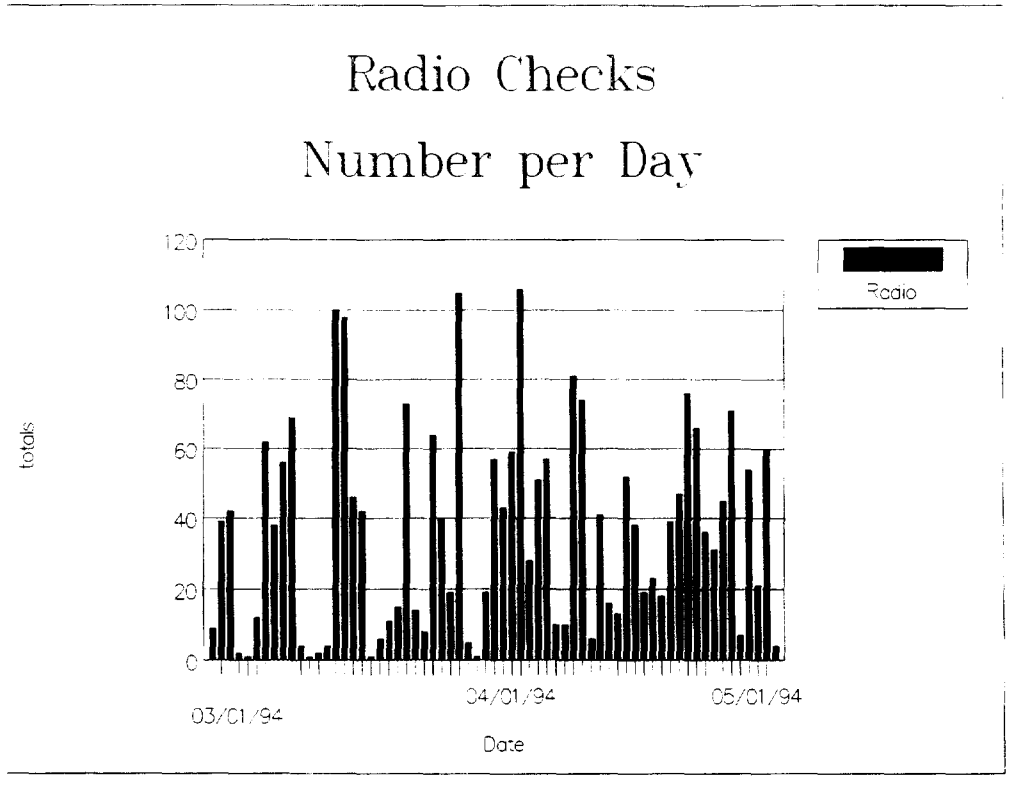
TRANSMIT WHEN A distribution of the number and type of communication events taking place at any hour during the entire study period to date.

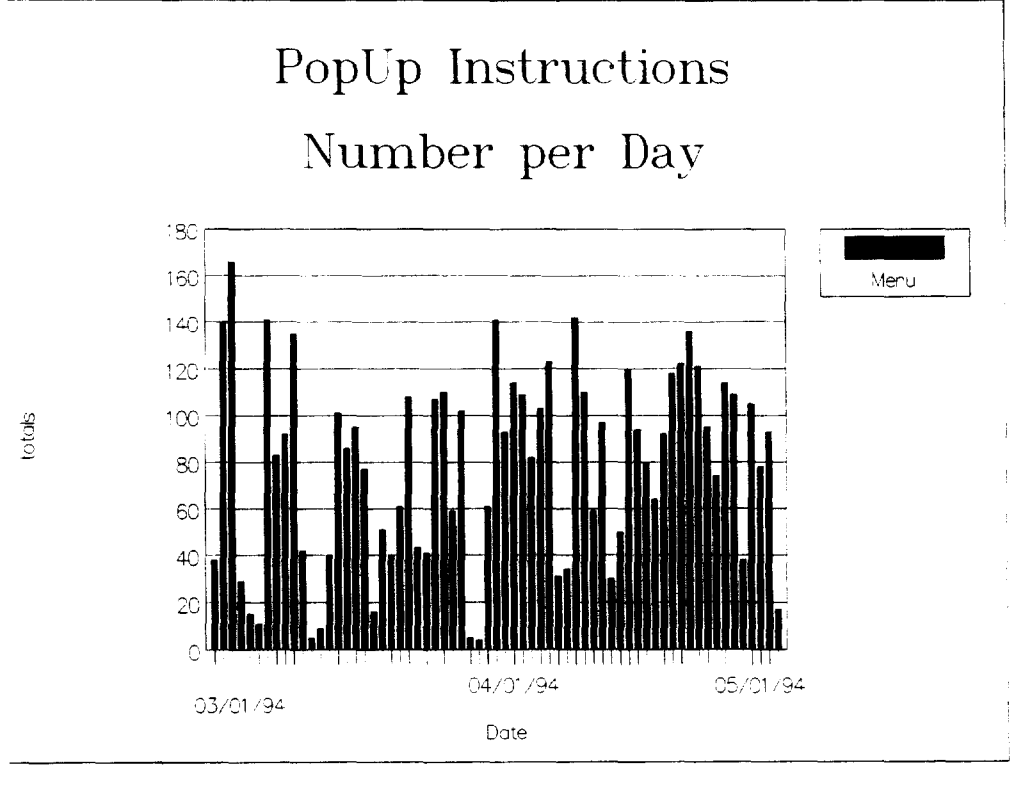
SUPERUNICOM SERVICES PROVIDED BY HOUR OF DAY

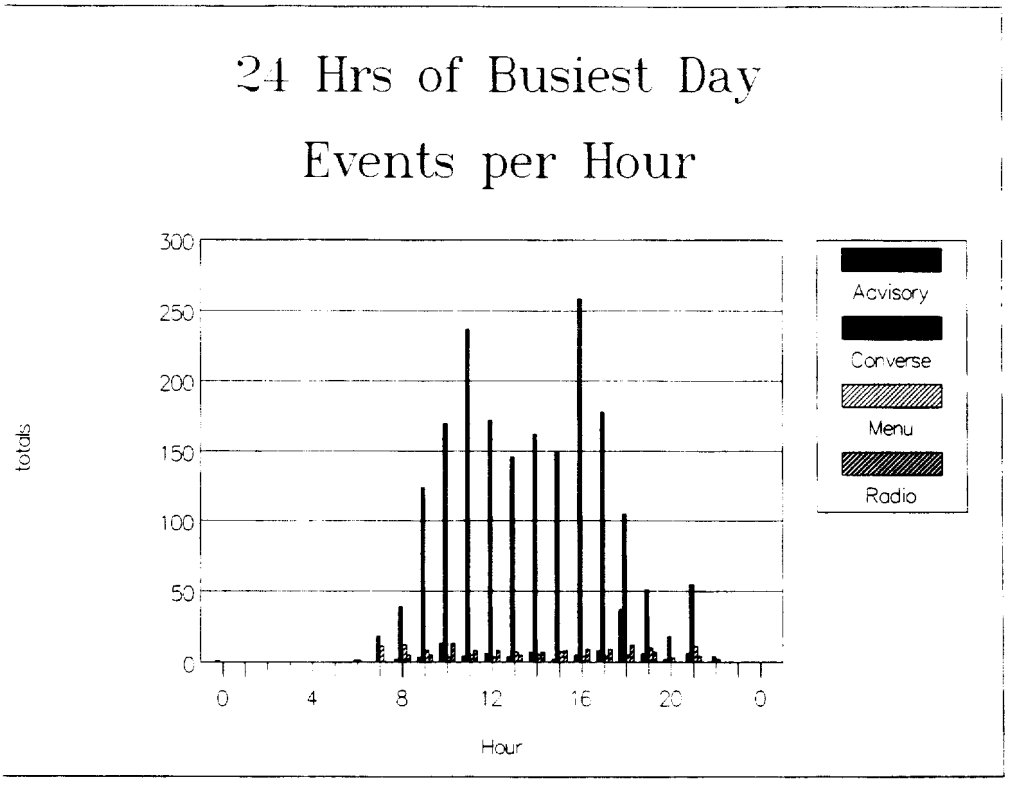
Hour	Converse	Advisories	Radio	Menu
---------- AIRPORT UNATTENDED ----------				
00:00 - 00:59	64	8	1	26
01:00 - 01:59	85	9	3	31
02:00 - 02:59	113	6	2	39
03:00 - 03:59	22	1	0	8
04:00 - 04:59	32	1	1	5
05:00 - 05:59	4	3	4	4
06:00 - 06:59	36	5	9	17
07:00 - 07:59	385	42	52	158
---------- AIRPORT ATTENDED ----------				
08:00 - 08:59	1490	159	157	280
09:00 - 09:59	2569	188	197	347
10:00 - 10:59	2943	232	260	333
11:00 - 11:59	3366	208	196	373
12:00 - 12:59	2863	261	254	366
13:00 - 13:59	2613	253	192	385
14:00 - 14:59	2627	241	194	353
15:00 - 15:59	2472	187	154	363
16:00 - 16:59	2790	212	210	398
17:00 - 17:59	3048	277	153	361
---------- AIRPORT UNATTENDED ----------				
18:00 - 18:59	2987	264	147	408
19:00 - 19:59	2480	130	89	329
20:00 - 20:59	840	95	45	230
21:00 - 21:59	704	71	19	181
22:00 - 22:59	157	51	26	62
23:00 - 23:59	110	28	2	44

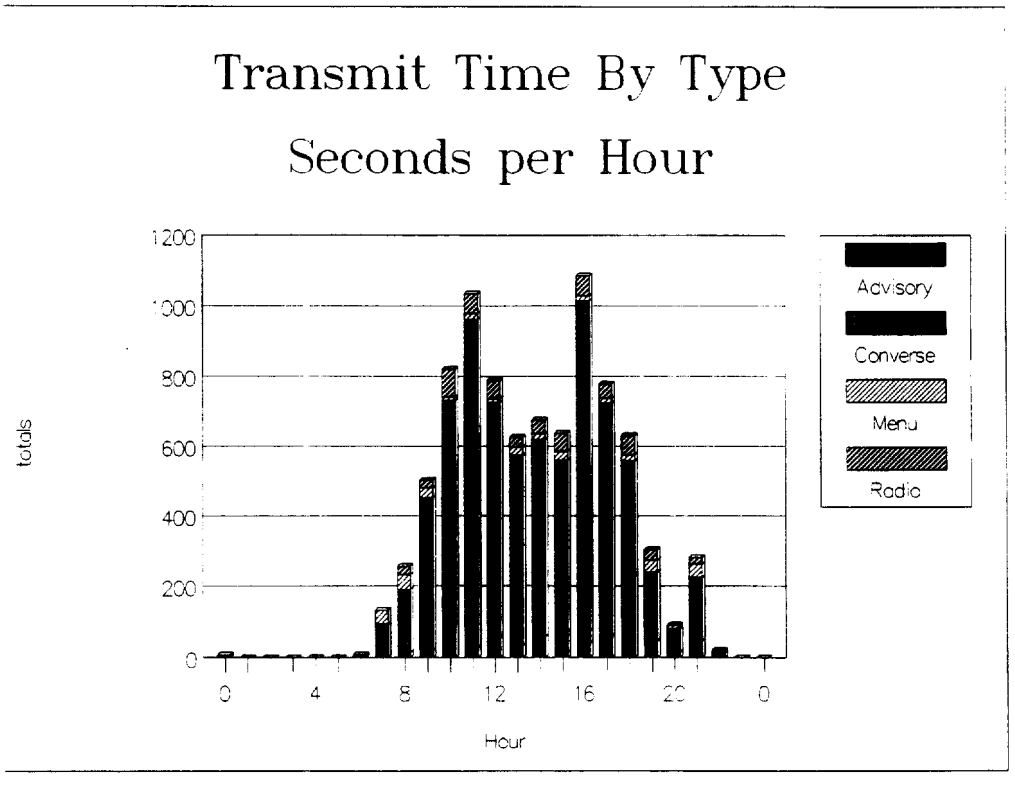

Conversations
Number Per Day
2000
1500
1000
500
0
totals
Converse
03/01/94
04/01/94
05/01/94
Date

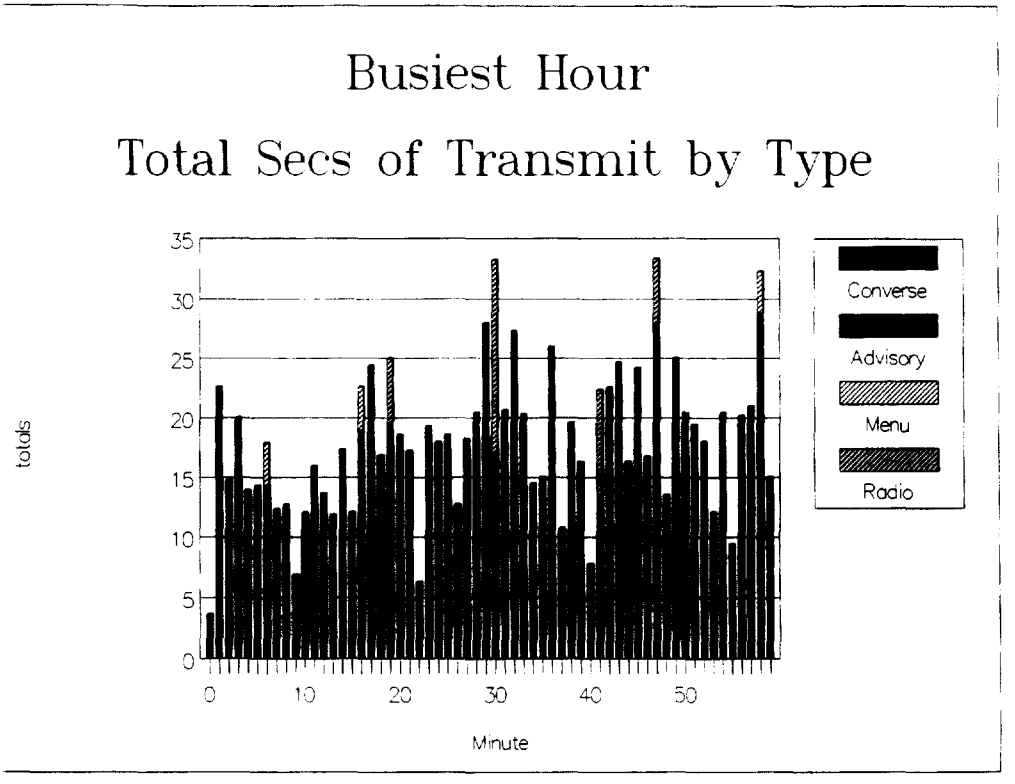

Advisories
Number per Day
120
100
80
60
40
20
0
totals
Advisory
03/01/94
04/01/94
05/01/94
Date


Radio Checks
Number per Day
120
100
80
60
40
20
0
totals
Radio
03/01/94
04/01/94
05/01/94
Date


PopUp Instructions
Number per Day
180
160
140
120
100
80
60
40
20
0
totals
Menu
03/01/94
04/01/94
05/01/94
Date


24 Hrs of Busiest Day
Events per Hour
totals
300
250
200
150
100
50
0
0
4
8
12
16
20
0
Hour
Advisory
Converse
Menu
Radio


Transmit Time By Type
Seconds per Hour
totals
1200
1000
800
600
400
200
0
0
4
8
12
16
20
0
Hour
Advisory
Converse
Menu
Radio


Busiest Hour
Total Secs of Transmit by Type
totals
35
30
25
20
15
10
5
0
0
10
20
30
40
50
Minute
Converse
Advisory
Menu
Radio

APPENDIX B:

BAYBRIDGE AIRPORT

SYSTEM ACTIVITY

3/10/94 through 5/3/94

SUMMARY OF GRAPHS

The graphs in the following section are taken from the historical data recorded by the SUPERUNICOM systems on site. The graphs are explained briefly below:

CONVERSATIONS A count of the total number of conversations that took place on each day. The average conversation lasts 4.04 seconds.

ADVISORIES A count of the total Advisories that the SUPERUNICOM provided each day. Advisory may be as short as 4 seconds and as long as 20 seconds, depending on congestion of the frequency. The average Advisory is 8.48 seconds in length.

RADIO-CHECKS A count of the total number of Radio Checks that were performed each day by the SUPERUNICOM. Recent updates limit the length of Radio-Checks to 5 secs of recording time, thus the average Radio-Check is 5.71 seconds.

POPUP INSTR A count of the total number of PopUp instructions were provided by the SUPERUNICOM for each day. PopUp instructions are under 3.55 seconds in length.

BUSIEST DAY The total number of transmission events on an hour-by-hour basis during the busiest day of the study period to date.

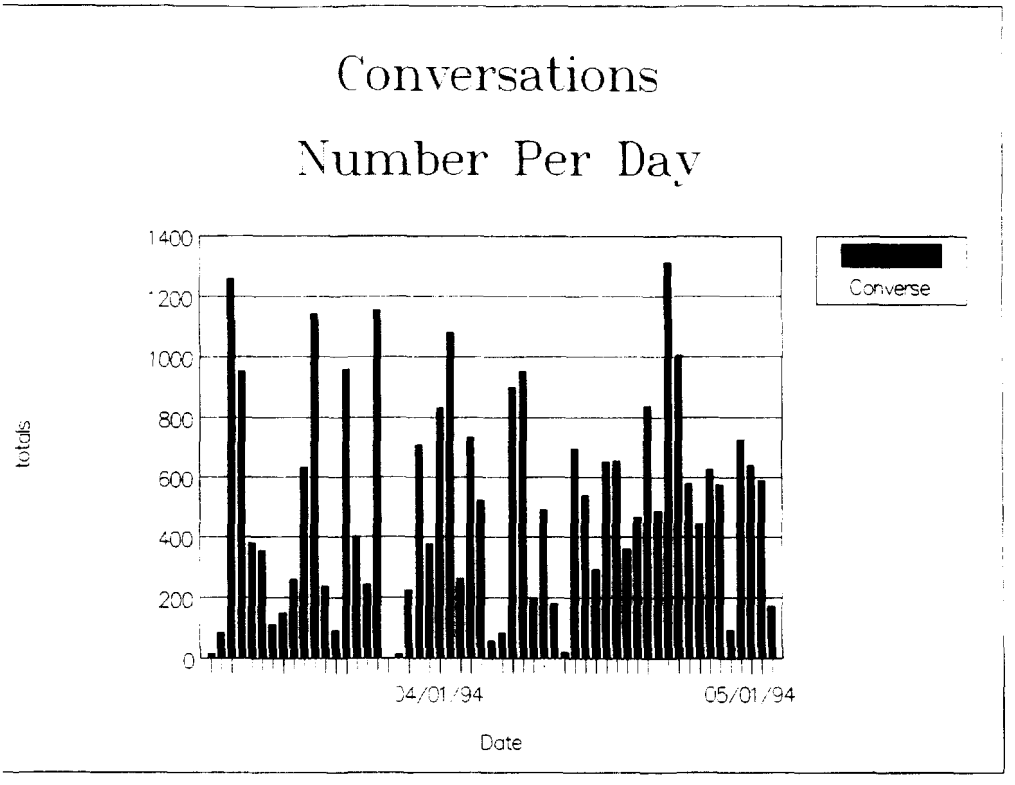
TRANSMIT TIME The total duration in seconds of each type of transmission on an hour-by-hour basis during the busiest day of the study period to date.

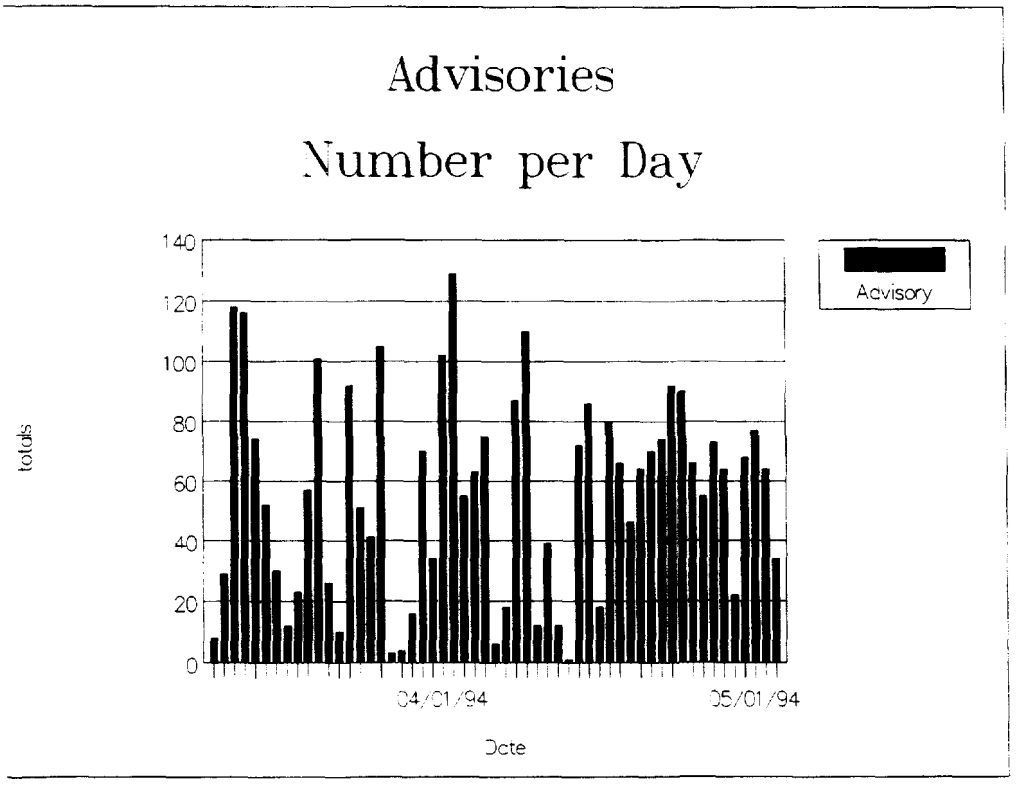
BUSIEST HOUR The total duration in seconds of each type of transmission event during the busiest hour of the busiest day of the study period to date.

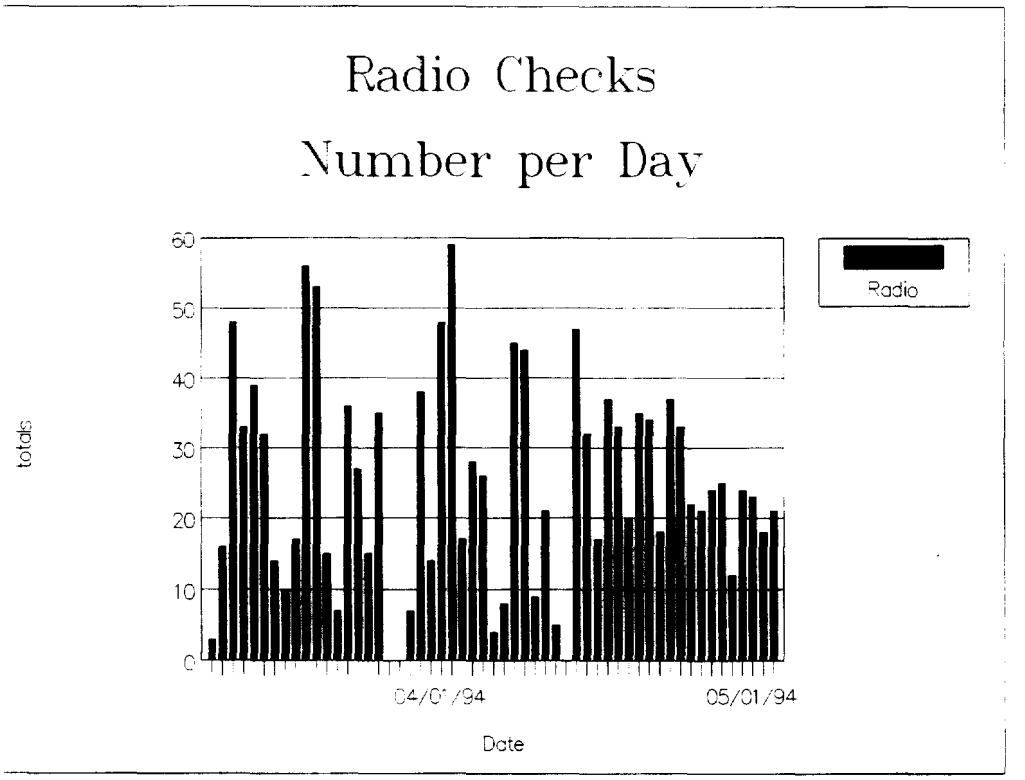
TRANSMIT WHEN A distribution of the number and type of communication events taking place at any hour during the entire study period to date.

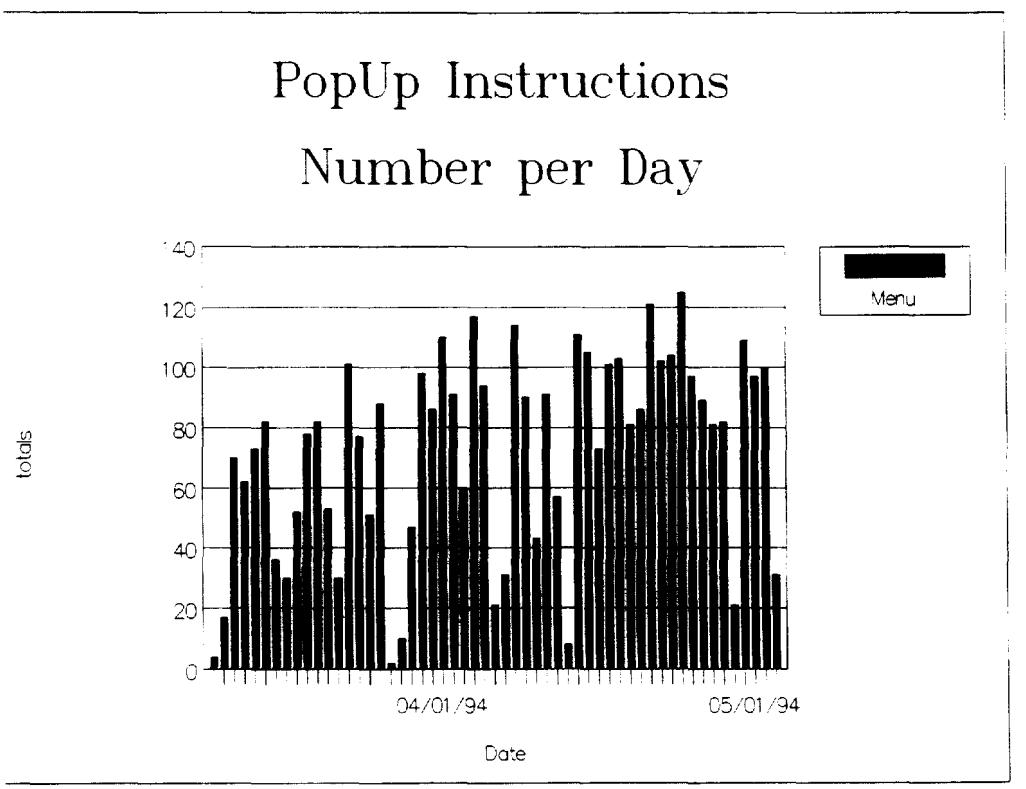
SUPERUNICOM SERVICES PROVIDED BY HOUR OF DAY

Hour	Converse	Advisory	Radio	Menu
---------- AIRPORT UNATTENDED ----------				
00:00 - 00:59	1	3	1	1
01:00 - 01:59	3	0	0	2
02:00 - 02:59	1	2	2	1
03:00 - 03:59	1	0	0	1
04:00 - 04:59	25	8	14	6
05:00 - 05:59	49	13	9	16
06:00 - 06:59	247	34	23	79
07:00 - 07:59	658	110	55	138
---------- AIRPORT ATTENDED ----------				
08:00 - 08:59	1581	184	89	274
09:00 - 09:59	2142	265	159	307
10:00 - 10:59	2532	236	99	329
11:00 - 11:59	2213	292	116	316
12:00 - 12:59	2391	273	115	284
13:00 - 13:59	2618	265	99	308
14:00 - 14:59	2537	280	108	287
15:00 - 15:59	2922	277	111	342
16:00 - 16:59	3011	261	106	369
17:00 - 17:59	2430	187	58	328
---------- AIRPORT UNATTENDED ----------				
18:00 - 18:59	1305	121	65	242
19:00 - 19:59	656	99	53	169
20:00 - 20:59	312	66	32	88
21:00 - 21:59	148	56	36	63
22:00 - 22:59	65	31	9	23
23:00 - 23:59	12	4	4	3


Conversations
Number Per Day
1400
1200
1000
800
600
400
200
0
totals
04/01/94
05/01/94
Date
Converse

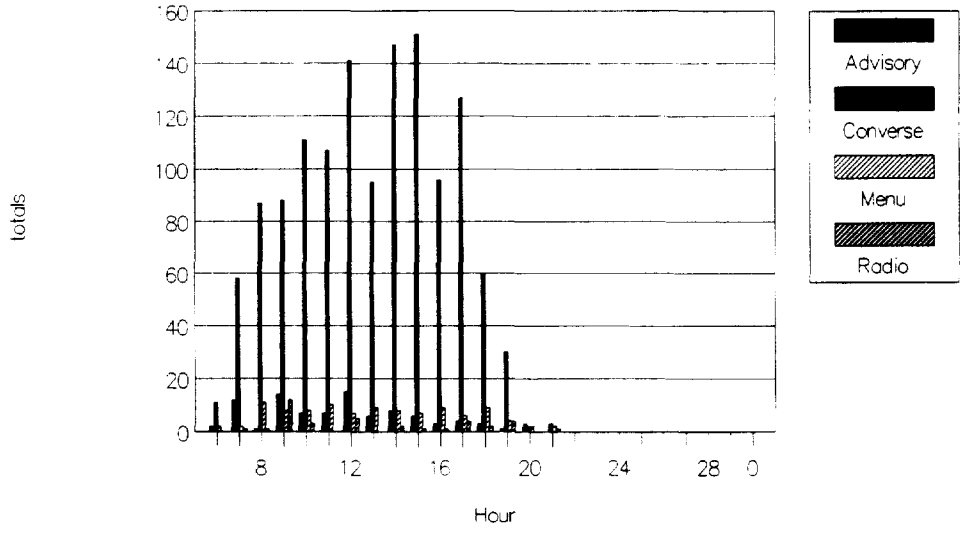

Advisories
Number per Day
140
120
100
80
60
40
20
0
totals
04/01/94
05/01/94
Date
Advisory


Radio Checks
Number per Day
60
50
40
30
20
10
0
totals
04/01/94
05/01/94
Date
Radio


PopUp Instructions
Number per Day
140
120
100
80
60
40
20
0
totals
04/01/94
05/01/94
Date
Menu

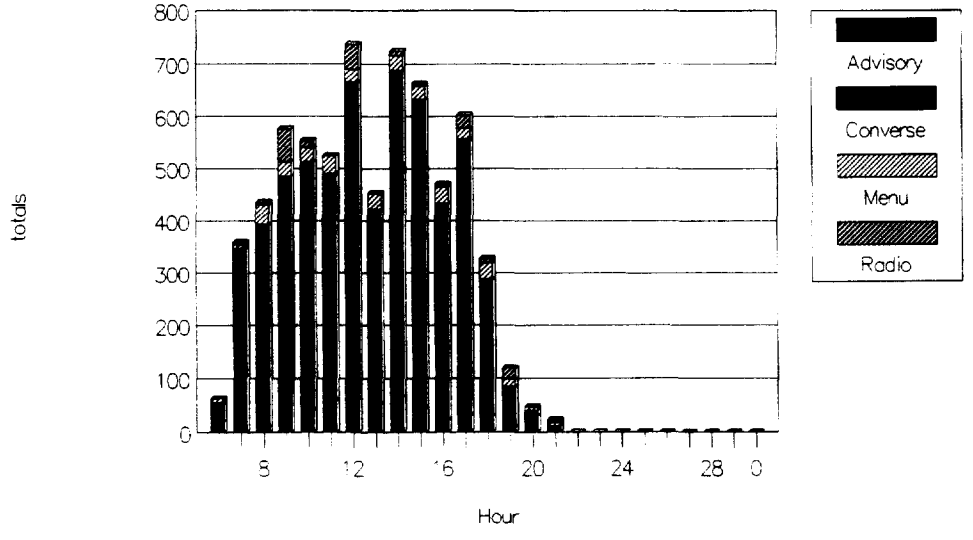
24 Hrs of Busiest Day

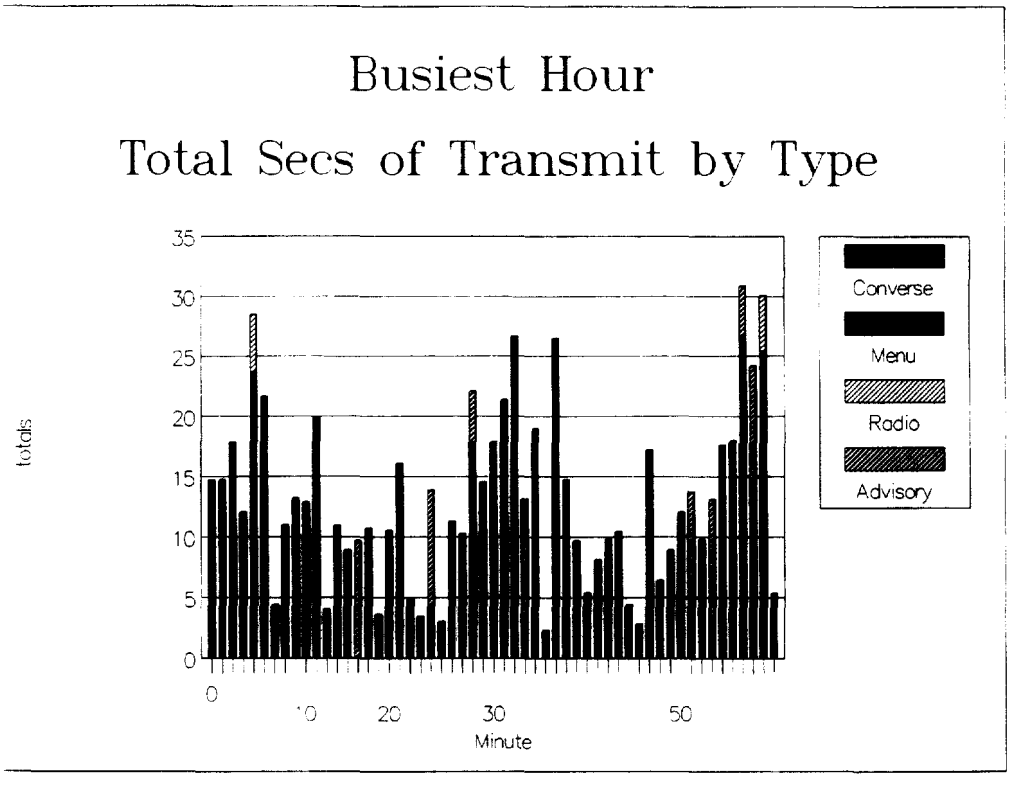
Events per Hour



Transmit Time By Type

Seconds per Hour




Busiest Hour
Total Secs of Transmit by Type
totals
35
30
25
20
15
10
5
0
0
10
20
30
50
Minute
Converse
Menu
Radio
Advisory

APPENDIX C: SAMPLE OF DATA: BAY BRIDGE – BUSIEST HOUR OF BUSY DAY 3/12/94

Time	Action	Length	Time	Action	Length	Time	Action	Length	Time	Action	Length
14:00.04	Converse	3.90	14:14.19	Converse	1.70	14:23.15	Converse	4.51	14:43.00	Radio	3.90
14:00.28	Converse	2.47	14:14.24	Converse	1.59	14:23.21	Converse	3.13	14:43.07	Advisory	2.47
14:01.03	Converse	5.77	14:14.26	Converse	1.87	14:23.35	Converse	1.65	14:43.14	Radio	7.15
14:01.48	Converse	4.51	14:14.29	Converse	1.43	14:24.12	Converse	4.95	14:43.21	Converse	3.52
14:01.56	Converse	9.84	14:14.45	Converse	1.43	14:24.17	Converse	2.69	14:44.17	Converse	5.50
14:02.09	Converse	3.46	14:14.46	Converse	2.80	14:24.42	Advisory	8.14	14:45.04	Converse	8.14
14:02.25	Converse	6.21	14:14.52	Converse	1.10	14:24.55	Converse	2.53	14:45.23	Converse	3.13
14:02.36	Converse	7.04	14:14.54	Other	0.00	14:25.10	Converse	7.59	14:46.01	Radio	4.40
14:03.17	Converse	3.74	14:14.55	Converse	2.53	14:25.25	Converse	4.95	14:46.13	Converse	4.78
14:03.22	Converse	1.54	14:15.00	Converse	3.68	14:25.46	Converse	2.64	14:46.34	Converse	4.23
14:03.26	Converse	1.48	14:15.08	Converse	3.74	14:26.01	Converse	6.05	14:46.43	Converse	6.65
14:03.28	Converse	1.54	14:15.12	Converse	3.68	14:26.13	Converse	3.63	14:48.03	Converse	5.72
14:03.36	Converse	4.29	14:15.17	Converse	10.23	14:26.56	Converse	5.17	14:48.10	Converse	2.69
14:03.50	Menu	3.35	14:15.29	Converse	3.46	14:27.03	Converse	4.56	14:48.15	Converse	4.78
14:04.01	Converse	2.14	14:15.35	Converse	6.60	14:27.19	Converse	3.63	14:48.30	Converse	4.73
14:04.15	Converse	4.84	14:15.53	Converse	9.40	14:27.38	Converse	4.95	14:48.42	Converse	3.41
14:04.41	Converse	6.82	14:16.05	Converse	4.89	14:27.57	Converse	4.12	14:48.47	Converse	6.71
14:05.00	Converse	4.12	14:16.10	Converse	2.14	14:28.04	Converse	3.79	14:49.01	Converse	4.56
14:05.06	Converse	2.80	14:16.14	Converse	1.21	14:28.17	Converse	4.40	14:49.48	Converse	2.97
14:05.11	Radio	4.67	14:16.18	Converse	5.00	14:28.44	Converse	3.68	14:49.52	Converse	4.40
14:05.19	Converse	3.96	14:16.30	Converse	3.24	14:29.25	Converse	3.46	14:50.11	Converse	5.06
14:05.30	Converse	4.84	14:16.39	Converse	4.62	14:29.30	Converse	2.47	14:50.19	Converse	4.29
14:05.43	Converse	2.20	14:16.53	Converse	3.24	14:29.34	Converse	3.96	14:50.53	Converse	2.36
14:05.46	Converse	2.47	14:16.58	Converse	3.24	14:29.52	Converse	5.17	14:50.55	Converse	2.97
14:06.18	Converse	6.10	14:17.11	Converse	3.13	14:30.12	Converse	4.07	14:51.21	Converse	5.39
14:06.46	Converse	3.08	14:17.25	Converse	4.18	14:30.17	Converse	3.90	14:51.47	Converse	5.44
14:06.54	Converse	2.91	14:17.31	Converse	4.89	14:31.01	Converse	4.07	14:51.52	Converse	3.52
14:07.15	Converse	8.25	14:17.40	Converse	2.80	14:31.24	Converse	3.30	14:51.57	Converse	3.46
14:07.37	Converse	4.78	14:17.43	Converse	5.83	14:31.28	Converse	4.29	14:52.12	Other	0.00
14:07.56	Converse	4.07	14:17.50	Converse	4.56	14:31.55	Converse	2.53	14:52.16	Converse	2.20
14:08.19	Converse	5.61	14:17.55	Converse	1.70	14:32.09	Converse	1.87	14:52.18	Converse	3.96
14:08.27	Converse	3.46	14:17.58	Converse	1.15	14:32.12	Converse	4.73	14:52.33	Radio	10.61
14:08.42	Converse	4.07	14:18.12	Converse	3.90	14:32.20	Converse	3.41	14:52.59	Converse	3.79
14:09.07	Converse	4.01	14:18.17	Converse	3.19	14:32.37	Converse	5.44	14:53.14	Advisory	8.03
14:09.14	Converse	4.01	14:18.23	Advisory	6.76	14:33.25	Converse	5.44	14:53.25	Converse	4.73
14:09.37	Converse	3.63	14:18.33	Converse	5.99	14:33.33	Converse	1.21	14:53.34	Radio	8.25
14:10.05	Converse	4.45	14:18.40	Converse	3.41	14:33.53	Converse	4.84	14:53.46	Other	0.00
14:10.10	Converse	5.39	14:18.46	Converse	3.85	14:34.12	Converse	1.37	14:53.50	Converse	4.84
14:10.23	Converse	9.62	14:19.13	Converse	4.18	14:34.22	Converse	2.58	14:54.01	Radio	4.78
14:10.36	Converse	2.53	14:19.17	Converse	5.61	14:34.39	Converse	4.01	14:54.10	Radio	4.67
14:10.41	Converse	2.86	14:19.49	Converse	3.74	14:34.54	Menu	3.35	14:54.39	Converse	3.35
14:10.47	Radio	5.44	14:19.57	Converse	3.41	14:35.08	Converse	3.24	14:54.45	Converse	.93
14:10.55	Converse	3.57	14:20.13	Advisory	9.90	14:35.29	Advisory	9.73	14:54.47	Converse	1.48
14:11.02	Advisory	2.47	14:20.25	Converse	4.23	14:36.51	Converse	5.88	14:54.56	Converse	5.22
14:11.06	Converse	3.90	14:20.30	Converse	3.79	14:39.05	Converse	5.66	14:56.23	Converse	4.40
14:11.16	Converse	4.29	14:20.55	Converse	3.85	14:39.15	Converse	4.18	14:56.36	Converse	4.07
14:11.29	Converse	3.13	14:21.00	Converse	3.41	14:39.29	Menu	3.35	14:56.43	Converse	5.06
14:11.34	Converse	3.79	14:21.18	Advisory	8.30	14:39.41	Converse	9.13	14:57.22	Converse	3.68
14:11.40	Converse	5.39	14:21.28	Converse	4.29	14:40.33	Converse	6.54	14:57.53	Converse	2.91
14:12.01	Converse	2.80	14:21.36	Converse	3.68	14:40.48	Converse	4.01	14:57.59	Converse	1.92
14:12.16	Converse	3.52	14:21.48	Advisory	5.28	14:41.19	Converse	5.06	14:58.02	Converse	1.59
14:12.29	Converse	11.82	14:22.13	Converse	3.52	14:41.50	Converse	7.81	14:58.11	Converse	3.08
14:12.56	Converse	4.18	14:22.18	Converse	6.05	14:42.00	Converse	5.50	14:58.22	Converse	6.21
14:13.04	Converse	4.07	14:22.29	Converse	5.28	14:42.07	Converse	2.86	14:58.28	Converse	.99
14:13.20	Converse	3.85	14:22.36	Converse	1.37	14:42.13	Advisory	2.47			
14:13.45	Converse	4.40	14:22.38	Converse	3.85	14:42.28	Converse	3.68			
14:13.51	Converse	2.14	14:22.56	Advisory	8.08	14:42.38	Advisory	5.11			
14:13.55	Converse	3.19	14:23.05	Converse	2.69	14:42.50	Converse	2.47			
14:14.03	Converse	5.99	14:23.09	Converse	1.26	14:42.54	Converse	2.80			